Albert Ludwigs University
Clinical Centre, Freiburg

Patent Claims

1) Use of low molecular weight hyaluronic acid fragments, which can be suitably modified, where appropriate, for producing a vaccine.

2) Use according to Claim 1, in which the vaccine can be used for treating cancer diseases.

3) Use according to Claim 1 or 2, in which the hyaluronic acid fragments, which can be suitably modified, where appropriate, consist of from 1 to 50 basic units.

4) Use according to Claim 3, in which the hyaluronic acid fragment is UDP-β-D-N-acetylglucosamine (fragment from one basic unit).

5) Use according to one of Claims 1 to 4, wherein the low molecular weight hyaluronic acid fragments, which can be suitably modified chemically, where appropriate, are used for concentrating dendritic cells which are then employed as the vaccine.

6) Process for concentrating dendritic cells, which comprises the following steps:

a) mononuclear cells are isolated from blood,
b) cells which possess the CD14 surface marker are concentrated,
c) the cells which possess the CD14 surface marker are cultured in a medium which contains the cytokines GM-CSF and IL-4, and
d) the cells obtained in step c) are cultured together with hyaluronic acid fragments, which can be suitably modified, where appropriate, in order to cause the cells to mature irreversibly into dendritic cells.

7) Process according to Claim 6, characterized in that the blood mononuclear cells are isolated from a leukocyte concentrate using a density gradient, in particular a Ficoll density gradient.

8) Process according to Claim 6 or 7, charac-

terized in that the cells possessing the CD14 surface marker are concentrated using at least one antibody which is directed against the CD14 surface marker.

9) Process according to one of Claims 6 to 8, characterized in that the cells possessing the CD14 surface marker are cultured in a medium which contains GM-CSF at a concentration of from 5 000 to 10 000 U/ml and IL-4 at a concentration of from 100 to 1 000 U/ml.

10) Process according to one of Claims 6 to 9, characterized in that the cells in step d) are cultured together with hyaluronic acid fragments which contain from 1 to 50 hyaluronic acid basic building blocks, with the basic building block being an amino-disaccharide consisting of D-glucuronic acid and N-acetyl-D-glucosamine which are linked by a β1-3 glycosidic bond.

11) Process according to Claim 10, characterized in that the hyaluronic acid fragments each contain from 1 to 10 aminodisaccharides.

12) Process according to one of Claims 6 to 11, characterized in that the cells possessing the CD14 surface marker are cultured, for between 72 hours and 7 days, in a medium containing GM-CSF and IL-4.

13) Process according to one of Claims 6 to 12, characterized in that the cells in step d) are cultured together with hyaluronic acid fragments for at least 48 hours.

14) Process according to one of Claims 6 to 13, characterized in that chemically modified hyaluronic acid fragments are used.

15) Enriched dendritic cells, obtainable by a process according to one of Claims 6 to 14.

16) Use of enriched dendritic cells according to Claim 15 for producing a vaccine.

17) Use according to Claim 16, in which the vaccine is used for treating cancer diseases.

18) Use according to one of Claims 1 to 4, wherein the vaccine comprises low molecular weight hyaluronic acid fragments, which can be suitably modified

chemically, where appropriate, and an antigen or peptide, where appropriate together with a carrier system.

19) Vaccine comprising an antigen or peptide, where appropriate together with a carrier system and a low molecular weight hyaluronic acid fragment which can be suitably modified chemically, where appropriate.

20) Vaccine according to Claim 19, wherein the vaccine is prepared for subcutaneous, intracutaneous or intravenous administration.

21) Vaccine according to Claim 19 or 20, wherein the vaccine consists of a formulation which comprises the antigen or peptide, where appropriate together with a carrier system, and the low molecular weight hyaluronic acid fragment, which can be suitably modified, where appropriate.

22) Vaccine according to Claim 19 or 20, wherein the vaccine comprises two separate formulations, with one formulation comprising the antigen or peptide, where appropriate together with a carrier system, and the other formulation comprising the low molecular weight hyaluronic acid fragment, which can be suitably modified, where appropriate.

23) Vaccine according to one of Claims 19 to 22 for use in treating cancer diseases.

24) Vaccine according to one of Claims 19 to 23 wherein the low molecular weight hyaluronic acid fragment, which can be suitably modified, where appropriate, consists of from 1 to 50 basic units.

25) Use according to one of Claims 1 to 4, wherein the vaccine comprises a system in which the low molecular weight hyaluronic acid fragment, which can be suitably modified, where appropriate, is coupled to a peptide or antigen.

26) System comprising a low molecular weight hyaluronic acid fragment, which can be suitably modified, where appropriate, coupled to an antigen or peptide.

27) System according to Claim 26, in which the low

molecular weight hyaluronic acid fragment, which can be suitably modified, where appropriate, is chemically bonded to the antigen or peptide.

28) System according to Claim 26, in which the low molecular weight hyaluronic acid fragment, which can be suitably modified, where appropriate, and the peptide or antigen are present as separate molecules in a microsphere.

29) System according to one of Claims 26 to 28, in which the low molecular weight hyaluronic acid fragment, which can be suitably modified, where appropriate, comprises from 1 to 50 basic building blocks.

30) System according to Claim 29, in which the low molecular weight hyaluronic acid fragment, which can be suitably modified, where appropriate, is UDP-β-D-N-acetylglucosamine (fragment from one basic building block).

31) System according to one of Claims 26 to 30, in which the antigen or peptide is present together with a carrier system.

32) Vaccine comprising a system according to one of Claims 26 to 31.

33) Vaccine according to Claim 32 for treating cancer diseases.